SEQUENCE LISTING

<110> Gaisser, Sabine
Haydock, Stephen F.
Leadlay, Peter, F.
McArthur, Hamish A.I.

<120> Polyketides and their synthesis

<130> 0380-P04095US00

<140> Not yet assigned
<141> Herewith

<150> PCT/GB2004/005001
<151> 2004-11-29

<150> GB0327721.7
<151> 2003-11-28

<160> 57

<170> PatentIn version 3.2

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Leu Leu Pro Val Tyr Asp Lys Pro Met Ile Tyr Tyr Pro Leu Ser Val
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Leu Met Leu Ala Gly Ile Arg Glu Ile Gln Ile Ile Ser Ser Lys Asp
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His Leu Asp Leu Phe Arg Ser Leu Leu Gly Glu Gly Asp Arg Leu Gly
65   70   75   80

Leu Ser Ile Ser Tyr Ala Glu Gln Arg Glu Pro Arg Gly Ile Ala Glu
                85   90   95

Ala Phe Leu Ile Gly Ala Arg His Ile Gly Gly Asp Asp Ala Ala Leu
                100   105   110

Ile Leu Gly Asp Asn Val Phe His Gly Pro Gly Phe Ser Ser Val Leu
            115   120   125

Thr Gly Thr Val Ala Arg Leu Asp Gly Cys Glu Leu Phe Gly Tyr Pro
    130   135   140

Val Lys Asp Ala His Arg Tyr Gly Val Gly Glu Ile Asp Ser Gly Gly
145   150   155   160

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Arg Leu Leu Ser Leu Glu Glu Lys Pro Arg Arg Pro Arg Ser Asn Leu
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Arg Thr Ile Ser Pro Ser Ala Arg Gly Glu Leu Glu Ile Thr Asp Val
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Asn Lys Val Tyr Leu Glu Gln Gly Arg Ala Arg Leu Thr Glu Leu Gly
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Arg Gly Phe Ala Trp Leu Asp Met Gly Thr His Asp Ser Leu Leu Gln
225             230             235             240

Ala Gly Gln Tyr Val Gln Leu Leu Glu Gln Arg Gln Gly Glu Arg Ile
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Ala Cys Ile Glu Glu Ile Ala Met Arg Met Gly Phe Ile Ser Ala Glu
            260             265             270

Gln Cys Tyr Arg Leu Gly Gln Glu Leu Arg Ser Ser Ser Tyr Gly Ser
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Tyr Ile Ile Asp Val Ala Met Arg Gly Ala Ala Ala Asp Ser Arg Ala
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Leu Leu Pro Val Tyr Asp Lys Pro Met Ile Tyr Tyr Pro Leu Ser Val
        35              40              45

Leu Met Leu Ala Gly Ile Arg Glu Ile Gln Ile Ile Ser Ser Lys Asp
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His Leu Asp Leu Phe Arg Ser Leu Leu Gly Glu Gly Asp Arg Leu Gly
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Leu Ser Ile Ser Tyr Ala Glu Gln Arg Glu Pro Arg Gly Ile Ala Glu
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Ala Phe Leu Ile Gly Ala Arg His Ile Gly Gly Asp Asp Ala Ala Leu
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Ile Leu Gly Asp Asn Val Phe His Gly Pro Gly Phe Ser Ser Val Leu
             115             120             125

Thr Gly Thr Val Ala Arg Leu Asp Gly Cys Glu Leu Phe Gly Tyr Pro
    130             135             140

Val Lys Asp Ala His Arg Tyr Gly Val Gly Glu Ile Asp Ser Gly Gly
145             150             155             160

Arg Leu Leu Ser Leu Glu Glu Lys Pro Arg Arg Pro Leu Glu Pro Gly
             165             170             175

Arg His Arg Leu Tyr Leu Tyr Thr Asn Asp Val Val Glu Ile Ala Arg
             180             185             190

Thr Ile Ser Pro Ser Ala Arg Gly Glu Leu Glu Ile Thr Asp Val Asn
             195             200             205

Lys Val Tyr Leu Glu Gln Gly Arg Ala Ala His Gly Ala Gly Ala Val
    210             215             220

Val Ala Trp Leu Asp Met Gly Thr His Asp Ser Leu Leu Gln Ala Gly
225             230             235             240

Gln Tyr Val Gln Leu Leu Glu Gln Arg Gln Gly Glu Arg Ile Ala Cys
             245             250             255

Ile Glu Glu Ile Ala Met Arg Met Gly Phe Ile Ser Ala Glu Gln Cys
             260             265             270

Tyr Arg Leu Gly Gln Glu Leu Arg Ser Ser Ser Tyr Gly Ser Tyr Ile
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Thr Val Val Leu Asp Lys Leu Thr Tyr Ala Gly Asn Pro Ala Asn Leu
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Glu His Val Ala Gly His Pro Asp Leu Glu Phe Val Arg Gly Asp Ile
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Ala Asp Gln Ala Leu Val Arg Arg Leu Met Glu Gly Val Gly Leu Val
65              70              75              80

Val His Phe Ala Ala Glu Ser His Val Asp Arg Ser Ile Glu Ser Ser
                85              90              95

Glu Ala Phe Val Arg Thr Asn Val Glu Gly Thr Arg Val Leu Leu Gln
            100             105             110

Ala Ala Val Asp Ala Gly Val Gly Arg Phe Val His Ile Ser Thr Asp
            115             120             125

Glu Val Tyr Gly Ser Ile Ala Glu Gly Ser Trp Pro Glu Asp His Pro
    130             135             140

Leu Ala Pro Asn Ser Pro Tyr Ala Ala Thr Lys Ala Ala Ser Asp Leu
145             150             155             160

Leu Ala Leu Ala Tyr His Arg Thr Tyr Gly Leu Asp Val Arg Val Thr
                165             170             175

Arg Cys Ser Asn Asn Tyr Gly Pro Arg Gln Tyr Pro Glu Lys Ala Val
            180             185             190

Pro Leu Phe Thr Thr Asn Leu Leu Asp Gly Leu Pro Val Pro Leu Tyr
        195             200             205

Gly Asp Gly Gly Asn Thr Arg Glu Trp Leu His Val Asp Asp His Cys
    210             215             220

Arg Gly Val Ala Leu Val Ala Ala Gly Gly Arg Pro Gly Val Ile Tyr
225             230             235             240

Asn Ile Gly Gly Gly Thr Glu Leu Thr Asn Ala Glu Leu Thr Asp Arg
            245             250             255

Ile Leu Glu Leu Cys Gly Ala Asp Arg Ser Ala Val Arg Arg Val Ala
            260             265             270

Asp Arg Pro Gly His Asp Arg Arg Tyr Ser Val Asp Thr Thr Lys Ile
        275             280             285

Arg Glu Glu Leu Gly Tyr Ala Pro Arg Thr Gly Ile Thr Glu Gly Leu
    290             295             300
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                20   25   30

Thr Val Val Leu Asp Lys Leu Thr Tyr Ala Gly Asn Pro Ala Asn Leu
            35   40   45

Glu His Val Ala Gly His Pro Asp Leu Glu Phe Val Arg Gly Asp Ile
    50   55   60

Ala Asp His Gly Trp Trp Arg Arg Leu Met Glu Gly Val Gly Leu Val
65   70   75   80

Val His Phe Ala Ala Glu Ser His Val Asp Arg Ser Ile Glu Ser Ser
                85   90   95

Glu Ala Phe Val Arg Thr Asn Val Glu Gly Thr Arg Val Leu Leu Gln
                100   105   110

Ala Ala Val Asp Ala Gly Val Gly Arg Phe Val His Ile Ser Thr Asp
            115   120   125

Glu Val Tyr Gly Ser Ile Ala Glu Gly Ser Trp Pro Glu Asp His Pro
    130   135   140

Val Ala Pro Asn Ser Pro Tyr Ala Ala Thr Lys Ala Ala Ser Asp Leu
145   150   155   160

Leu Ala Leu Ala Tyr His Arg Thr Tyr Gly Leu Asp Val Arg Val Thr
                165   170   175

Arg Cyś Ser Asn Asn Tyr Gly Pro Arg Gln Tyr Pro Glu Lys Ala Val
                180   185   190

Pro Leu Phe Thr Thr Asn Leu Leu Asp Gly Leu Pro Val Pro Leu Tyr
            195   200   205

Gly Asp Gly Gly Asn Thr Arg Glu Trp Leu His Val Asp Asp His Cys
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Arg Gly Val Ala Leu Val Gly Ala Gly Gly Arg Pro Gly Val Ile Tyr
225   230   235   240

Asn Ile Gly Gly Gly Thr Glu Leu Thr Asn Ala Glu Leu Thr Asp Arg
                245   250   255

Ile Leu Glu Leu Cys Gly Ala Asp Arg Ser Ala Leu Arg Arg Val Ala
            260   265   270

Asp Arg Pro Gly His Asp Arg Arg Tyr Ser Val Asp Thr Thr Lys Ile
        275   280   285

Arg Glu Glu Leu Gly Tyr Ala Pro Arg Thr Gly Ile Thr Glu Gly Leu
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Ala Gly Thr Val Ala Trp Tyr Arg Asp Asn Arg Ala Trp Trp Glu Pro
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Leu Lys Arg Ser Pro Gly Gly Arg Glu Leu Glu Arg Ala
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aacggcgaca gcaccatcga cgacatggtg gcgctggccc gttcctggaa accggacctc     1740

gtcctgtggg agcccttcac ctacgcggga cccgtcgccg cgcacgcctg cggcgccgcc     1800

cacgcccggc tgctgtgggg tcccgacgtg gtcctcaacg cacggcggca gttcacccgg     1860

ctgctcgccg agcgccccgt cgaacagcgc gaggacccgg tcggcgaatg gctcacgtgg     1920

acgctggagc gccacggcct cgccgccgac gcggacacga tcgaggaact gttcgccggg     1980

cagtggacga tcgaccccag cgccgggagc ctgcggctgc cggtcgacgg cgaggtcgtg     2040

cccatgcgct tcgtgccgta caacggcgcc tcggtcgtcc ccgcctggct ctccgagccg     2100

cctgcccggc cccgggtctg cgtcaccctc ggcgtctcca cccgggagac ctacggcacg     2160
```

10

```
gacggcgtcc cgttccacga actgctggcc ggactggccg acgtggacgc cgagatcgtc   2220

gccaccctcg acgcggggca gctcccggac gccgccggtc tgcccggcaa tgtgcgcgtc   2280

gtcgacttcg tgccgctgga cgccctgctg ccgagctgcg ccgcgatcgt ccaccacgga   2340

ggcgcgggaa cctgtttcac ggccaccgtg cacggcgtcc cgcagatcgt cgtggcctcc   2400

ctctgggacg cgccgctgaa ggcgcaccaa ctcgccgagg cgggcgccgg gatcgccctg   2460

gacccggggg aactgggcgt ggacaccctg cgcggcgccg tcgtgcgggt gctggagagc   2520

cgcgagatgg ccgtggcggc gcgtcgcctc gccgacgaga tgctcgccgc ccccaccccg   2580

gccgcgctcg tcccccgcct cgaacgcctc accgccgcgc accgccgcgc ctgatcccgc   2640

caaggagccc ccatgaacct cgaatacagc ggcgacatcg cccggttgta cgacctggtc   2700

caccagggaa agggcaagga ctaccgggcg gaggccgagg agctggccgc gcttgtcacc   2760

cagcgccgcc ccggggcccg ctccctcctc gacgtggcct gcggaacggg gatgcacctg   2820

cggcacctcg gcgacctctt cgaggaggtg gccggggtgg agatgtcccc cgacatgctg   2880

gccatcgcgc agcggcgcaa cccggaggcc ggcatccacc ggggggacat gcgggacttc   2940

gccctcggcc gccgcttcga cgccgtgatc tgcatgttca gttccatcgg gcacatgcgc   3000

gaccagcggg aactggacgc ggcgatcggc cggttcgccg cgcacctgcc gtccggcggg   3060

gtcgtgatcg tcgatccctg gtggttcccg gagacgttca caccggggta cgtcggcgcg   3120

agcctcgtcg aggccgaggg ccgcaccatc gcgcgcttct cccactccgc gctcgaggac   3180

ggcgcgaccc ggatcgatgt ggactacctc gtcggcgtgc cgggggaggg ggtgcggcac   3240

ttgaaggaga cccatcggat cacgcttttc gggcgtgcgc agtacgaggc ggccttcacc   3300

gcggcggggga tgtccgtcga gtacctcccg cacgccgcca ccgaccgcgg actcttcgtc   3360

ggcgtccagg cctga                                                    3375
```

<210> 8
<211> 295
<212> PRT
<213> Streptomyces eurythermus

<400> 8

```
Met Lys Gly Ile Ile Leu Ala Gly Gly Ser Gly Thr Arg Leu Arg Pro
1               5                   10                  15

Leu Thr Gly Ala Leu Ser Lys Gln Leu Leu Pro Val Tyr Asp Lys Pro
                20                  25                  30

Met Ile Tyr Tyr Pro Leu Ser Val Leu Met Leu Ala Gly Ile Arg Asp
            35                  40                  45

Ile Gln Ile Ile Thr Ser Lys Thr His Leu Glu Met Phe Arg Ser Leu
        50                  55                  60

Leu Gly Asp Gly Ser Arg Ile Gly Ile Ser Val Gly Tyr Ala Glu Gln
65                  70                  75                  80
```

11

```
Glu Glu Pro Arg Gly Ile Ala Glu Ala Phe Leu Ile Gly Glu Glu His
              85                90                      95

Ile Gly Asp Asp Pro Val Ala Leu Ile Leu Gly Asp Asn Val Phe His
              100             105             110

Gly Pro Gly Phe Ser Ser Val Leu Ala Ser Thr Ala Ala Arg Leu Asp
          115             120             125

Gly Cys Glu Leu Phe Gly Tyr Pro Val Lys Asp Pro Arg Arg Tyr Gly
    130             135             140

Val Gly Glu Val Asp Ala Glu Gly Arg Leu Val Ser Leu Glu Glu Lys
145             150             155             160

Pro Glu Lys Pro Arg Ser His Leu Ala Val Thr Gly Leu Tyr Phe Tyr
              165             170             175

Asp Asn Gly Val Val Asp Ile Ala Arg Arg Leu Thr Pro Ser Pro Arg
              180             185             190

Gly Glu Leu Glu Ile Thr Asp Val Asn Lys Val Tyr Leu Glu Gln Gly
          195             200             205

Arg Ala Arg Met Thr Glu Leu Gly Arg Gly Phe Ala Trp Leu Asp Met
    210             215             220

Gly Thr His Ser Ser Leu Leu Gln Ala Gly Gln Tyr Val Gln Leu Leu
225             230             235             240

Glu Gln Arg Gln Gly Val Arg Ile Ser Cys Val Glu Glu Ile Ala Leu
              245             250             255

Arg Met Gly Tyr Ile Ser Ala Arg Gln Cys His Glu Leu Gly Arg Glu
              260             265             270

Leu Glu Ser Ser Ser Tyr Gly Arg Tyr Leu Met Asp Val Ala Glu Thr
    275             280             285

Leu Met Ser Gly Pro Ala Ala
    290             295

<210>    9
<211>    332
<212>    PRT
<213>    Streptomyces eurythermus

<400>    9

Met Arg Leu Leu Val Thr Gly Gly Ala Gly Phe Ile Gly Ser His Phe
1                5                10                      15

Val Arg Gln Leu Leu Ala Gly Ala Tyr Pro Asp Leu Ala Gly Ala Arg
                              12
```

Thr Val Val Val Asp Lys Leu Thr Tyr Ala Gly Asn Leu Ala Asn Leu
35 40 45

Asp Pro Val Ala Asp His Pro Ser Leu Glu Phe Val His Ala Asp Ile
50 55 60

Arg Asp Ala Glu Val Met Ser Arg Val Val Arg Gly Ala Asp Val Val
65 70 75 80

Val His Phe Ala Ala Glu Ser His Val Asp Arg Ser Ile Ala Asp Ala
85 90 95

Ser Ala Phe Val Glu Thr Asn Val Arg Gly Thr Gln Val Leu Leu Gln
100 105 110

Ala Ala Val Glu Ala Gly Ala Gly Arg Phe Val His Val Ser Thr Asp
115 120 125

Glu Val Tyr Gly Ser Ile Ala Glu Gly Ser Trp Arg Glu Glu Gln Pro
130 135 140

Leu Ala Pro Asn Ser Pro Tyr Ala Ala Ser Lys Ala Ala Ser Asp Leu
145 150 155 160

Leu Ala Leu Ala Tyr His Arg Thr Tyr Gly Leu Pro Val Val Val Thr
165 170 175

Arg Cys Ser Asn Asn Tyr Gly Pro Tyr Gln His Pro Glu Lys Val Val
180 185 190

Pro Leu Phe Ala Thr Asn Leu Leu Asp Gly Leu Thr Val Pro Leu Tyr
195 200 205

Ser Asp Gly Gly Asn Ser Arg Asp Trp Leu His Val Asp Asp His Cys
210 215 220

Arg Gly Ile Ser Leu Val Ala Thr Arg Gly Arg Pro Gly Glu Val Tyr
225 230 235 240

His Ile Gly Gly Gly Thr Glu Leu Thr Asn Arg Glu Leu Thr Lys Arg
245 250 255

Leu Leu Gly Leu Cys Gly Ala Asp Ala Ser Ser Val Arg His Val Ala
260 265 270

Asp Arg Pro Gly His Asp Leu Arg Tyr Ala Leu Asp Ile Gly Lys Ile
275 280 285

Thr Gly Glu Leu Gly Tyr Ala Pro Arg Thr Asp Phe Thr Thr Gly Leu
290 295 300

Ala Asp Thr Val Arg Trp Tyr Ala Glu Asn Arg Ala Trp Trp Glu Pro
305   310   315   320

Leu Lys Lys Ala Ala Gln Glu Ala Arg Arg Thr Asp
            325   330

<210>   10
<211>   787
<212>   PRT
<213>   Streptomyces eurythermus

<400>   10

Val Ser Thr Pro Ser Ala Pro Pro Val Pro Gly Ala Pro Ser Pro Ala
1   5   10   15

Gly His Pro Asp Glu Gly Leu Trp Val Arg Arg Tyr Arg Pro Val Arg
            20   25   30

Asp Pro Glu Leu Arg Leu Val Cys Phe Pro His Ala Gly Gly Ala Ala
            35   40   45

Thr Ser Phe Ala Ala Leu Ala Arg Gly Leu Asp Glu Thr Val Glu Ala
    50   55   60

Leu Ala Val Gln Tyr Pro Gly Arg Gln Asp Arg Arg His Glu Pro Phe
65   70   75   80

Ile Pro Ser Ile Ser Gly Leu Val Asp Gln Val Val Pro Glu Ile Leu
            85   90   95

Arg Trp Ala Asp Arg Pro Leu Ala Leu Phe Gly His Ser Met Gly Ala
            100   105   110

Thr Val Ala Phe Glu Val Ala Arg Arg Leu Arg Gly Ser Gly Gln Ala
    115   120   125

Ser Pro Val His Leu Leu Val Ser Gly Arg Arg Ala Pro Thr Val Arg
    130   135   140

Arg Arg Asp Val Ala His Leu Leu Asp Asp Asp Ala Leu Ile Ala Glu
145   150   155   160

Ile Ala Thr Leu Gln Gly Thr Glu Asp Ala Val Leu Gln Asp Glu Glu
            165   170   175

Leu Leu Arg Leu Ala Leu Pro Ala Ile Arg Asn Asp Tyr Arg Ala Ala
            180   185   190

Gly Thr Tyr Ala Tyr Val Pro Gly Gly Ala Leu Asp Cys Pro Val Thr
    195   200   205

14

```
Val Leu Thr Gly Asp Arg Asp Pro Asp Val Pro Leu Glu Glu Ala Arg
    210             215             220

Ala Trp Arg Glu Leu Thr Thr Gly Pro Phe Ala Leu His Thr Phe Ala
225             230             235             240

Gly Gly His Phe Tyr Leu Asn Asp Arg Met Asp Glu Val Cys Arg Thr
            245             250             255

Ile Gly Asp Ala Leu Ala Gly Thr Ala Thr Ala Asp Thr Ala Thr Gly
            260             265             270

Thr Val Pro Pro Arg Thr Ala Ala Asp Thr Ser Thr Gly Pro Val Pro
            275             280             285

Pro Arg Thr Ala Ala Asp Thr Ala Arg Glu Pro Val Pro Pro Arg Ser
        290             295             300

Ala Pro Ala Pro His Gly Ala Ala Arg Arg Arg Ala Asp Ala Val Arg
305             310             315             320

Pro Gly Asp Pro Val Asp Thr Ala Arg Arg Val Leu Val Ser Ala Arg
                325             330             335

Thr Ala Asp Ser Ala Val Thr Pro Phe Asp Gly Ile Ser Gly Trp Leu
            340             345             350

Ala Glu Arg Leu Arg Ala Gly Arg Phe Asp Val Ser Arg Val Pro Phe
            355             360             365

Ala Glu Leu Arg Gly Trp Ser Phe His Pro Gly Thr Gly Asn Leu His
    370             375             380

His Ala Ser Gly Arg Phe Phe Ser Val Glu Gly Leu His Val Arg Thr
385             390             395             400

Asp Arg Leu Pro Glu Arg Gly Trp Thr Gln Pro Ile Ile Val Gln Pro
                405             410             415

Glu Val Gly Leu Leu Gly Ile Val Ala Arg Glu Ile Asp Gly Val Leu
            420             425             430

His Phe Leu Met Gln Ala Lys Met Glu Pro Gly Asn Val Asn Val Leu
            435             440             445

Gln Val Ser Pro Thr Val Gln Ala Thr Arg Ser Asn Phe Thr Gly Val
    450             455             460

His Arg Gly Arg Asp Ile Arg Tyr Leu Asp Leu Phe Met Gly Pro Arg
465             470             475             480

Arg Ala Arg Val Leu Val Asp Ser Ile Gln Ser Glu Gln Ala Asp Trp
                            15
```

Phe Leu Ala Lys Arg Asn Arg Asn Met Ile Val Glu Leu Ala Ala Asp
            500   505   510

Asp Asp Leu Asp Ile Gly Glu Asp Phe Arg Trp Leu Thr Leu Gly Gln
            515   520   525

Leu Arg Arg Leu Leu Met Leu Asp Asn Val Val Asn Met Asp Ala Arg
    530   535   540

Ser Ile Leu Ala Cys Leu Pro Thr Ala Asp Ala Asp Ala Ser Ala Pro
545   550   555   560

Ser Pro Val Leu Arg Ser Phe Phe Gly Ser Pro Gly Ala Ala Arg His
            565   570   575

Thr Thr Ala Glu Val Leu Thr Trp Phe Thr Gly Val Arg Ala Leu Arg
            580   585   590

Glu Leu Val Gln Asn Arg Val Pro Leu Asp Thr Val Thr Ala Asp Gly
            595   600   605

Trp Tyr Arg Thr Pro His Glu Ile Ala His Glu Ser Gly Arg His Phe
    610   615   620

Arg Val Met Ala Ala Glu Val Ser Ala Ser Ser Arg Glu Val Thr Ser
625   630   635   640

Trp Thr Gln Pro Leu Ile Glu Pro Arg Leu Pro Gly Leu Met Ala Leu
            645   650   655

Leu Val Lys Ser Val Asp Gly Val Leu His Ala Leu Val Arg Ala Arg
            660   665   670

Val Asp Val Gly His Leu Asn Val Ala Glu Leu Ala Pro Thr Val Gln
    675   680   685

Cys Arg Pro Gln Glu His Thr Gly Pro Arg Gly Leu Pro Gly Pro Pro
    690   695   700

Tyr Leu Glu Asp Val Leu Ser Ala Pro Pro Gln Asp Val Arg Tyr Asp
705   710   715   720

Ala Val Gln Ser Glu Glu Gly Gly Arg Phe Phe His Ala Gln Asn Arg
            725   730   735

Tyr Val Ile Val Glu Val Pro His Asp Phe Pro Glu Asp Ala Pro Asp
            740   745   750

Asp Phe Ala Trp Leu Ser Leu Gly Gln Leu Thr Gly Leu Leu Ala His
            755   760   765

16

Gly Asn Tyr Leu Asn Ile Glu Leu Arg Thr Leu Val Ala Cys Ala His
    770   775   780

Thr Leu Tyr
785

<210>   11
<211>   333
<212>   PRT
<213>   Streptomyces eurythermus

<400>   11

Met Val Asn Asp Pro Met Pro Arg Gly Ser Gly Ser Gly Ser Val Val
1   5   10   15

Val Leu Gly Gly Ala Gly Tyr Val Gly Arg His Val Cys Ala Ala Phe
            20   25   30

Ala Ala Arg Gly Arg Asp Val Val Val Gly Arg Arg Pro Pro Glu
        35   40   45

Glu Pro Met Pro Tyr Arg Cys Val Thr Leu Asp Leu Ala Gly Thr Asp
    50   55   60

Pro Ala Ala Leu Ala Ala Ala Leu Asp Ala Glu Arg Pro Asp Thr Ile
65   70   75   80

Val Asn Ser Val Gly Ser Ile Trp Gly Arg Thr Asp Glu Gln Met Trp
            85   90   95

Ser Ala Thr Ala Val Pro Thr Leu Arg Leu Leu Glu Ala Leu Ala Leu
        100   105   110

Met Ser Ala Arg Pro Arg Leu Val His Leu Gly Ser Val Leu Glu Tyr
        115   120   125

Gly Pro Val Thr Pro Gly Gly Ser Val Gly Ala Asp Ala Val Pro Arg
    130   135   140

Pro Asp Thr Ala Tyr Gly Arg Ser Lys Leu Ala Ala Ser Glu Ala Val
145   150   155   160

Leu Arg Gly Thr Ser Gly Gly Trp Val Asp Gly Val Val Leu Arg Val
            165   170   175

Ser Asn Val Ser Gly Pro Gly Thr Pro Arg Ile Ser Leu Leu Gly Gln
            180   185   190

Val Ala Glu Arg Leu Leu Ala Ala Ala Gly Thr Gly Ala Glu Ala Val
        195   200   205

17

```
Val Glu Leu Ser Arg Leu Arg Ala His Arg Asp Tyr Val Asp Val Arg
    210                 215             220

Asp Val Ala Asp Ala Val Val Ala Ala Ala Arg Ala Pro Ala Val Pro
225             230                 235                 240

Val Ala Val Gly Ile Gly Arg Gly Glu Ala Val Ala Val Arg Asp Leu
            245                 250                 255

Val Gly Leu Phe Ile Glu Ala Ser Gly Ile Pro Ala Arg Val Val Glu
            260                 265                 270

Arg Pro Ala Pro Gly Arg Ala Pro Gly His Arg Glu Asp Trp Leu Arg
        275             280             285

Val Asp Thr Gly Ala Ala Arg Ala Leu Leu Gly Trp Ala Pro Arg Arg
    290             295             300

Ser Leu Arg Glu Ser Val Arg Asp Cys Trp His Asp Leu Val Arg Ala
305             310             315             320

His Arg Leu Pro Thr Thr Pro Ser Lys His Ser Gly Gly
            325             330

<210>   12
<211>   373
<212>   PRT
<213>   Streptomyces eurythermus

<400>   12

Val Thr Thr Tyr Val Trp Asp Tyr Leu Ala Glu Tyr Gln Asn Glu Arg
1               5               10              15

Ala Asp Leu Leu Asp Ala Val Glu Thr Val Phe Ala Ser Gly Gln Leu
            20              25              30

Val Leu Gly Pro Ser Val Asp Gly Phe Glu Lys Glu Phe Ala Asp Tyr
        35              40              45

His Gly Leu Arg His Cys Gly Gly Val Asp Asn Gly Thr Asn Ala Val
    50              55              60

Lys Leu Gly Leu Gln Ala Leu Gly Val Gly Pro Gly Asp Glu Val Val
65              70              75                      80

Thr Val Ser Asn Thr Ala Ala Pro Thr Val Val Ala Ile Asp Gly Thr
            85              90              95

Gly Ala Thr Pro Val Phe Val Asp Val Arg Ala Glu Asp His Leu Met
            100             105             110

Asp Thr Asp Gln Val Ala Asp Val Ile Thr Pro Arg Thr Lys Ala Leu
        115             120             125
                            18
```

```
Leu Pro Val His Leu Tyr Gly Gln Cys Val Asp Met Ala Pro Leu Arg
    130             135             140

Ala Leu Ala Glu Gln His Gly Leu Val Val Leu Glu Asp Cys Ala Gln
145             150             155             160

Ala His Gly Ala Arg His His Gly Glu Leu Ala Gly Thr Leu Gly Asp
                165             170             175

Ala Ala Ala Phe Ser Phe Tyr Pro Thr Lys Val Leu Gly Ala Tyr Gly
            180             185             190

Asp Gly Gly Ala Val Leu Thr Asp Asp Ala Asp Val Asp Arg Ala Leu
        195             200             205

Arg Arg Leu Arg Tyr Tyr Gly Met Glu Asp Val Tyr Tyr Val Val Gln
    210             215             220

Thr Pro Gly His Asn Ser Arg Leu Asp Glu Val Gln Ala Glu Ile Leu
225             230             235             240

Arg Arg Lys Leu Thr Arg Leu Asp Arg Tyr Ile Glu Gly Arg Arg Ala
                245             250             255

Val Ala Arg Arg Tyr Ala Glu Gly Leu Ala Asn Leu Thr Gly Pro Gly
            260             265             270

Gly Leu Val Leu Pro Ser Val Thr Glu Gly Asn Asp His Val Tyr Tyr
        275             280             285

Val Tyr Val Val Arg His Pro Arg Arg Asp Asp Ile Ile Glu Ala Leu
    290             295             300

Lys Ser Tyr Gly Ile Ser Leu Asn Ile Ser Tyr Pro Trp Pro Val His
305             310             315             320

Thr Met Thr Gly Phe Ala His Leu Gly Tyr Ala Lys Gly Ser Leu Pro
                325             330             335

Val Thr Glu Arg Leu Ala Asp Glu Ile Phe Ser Leu Pro Met Tyr Pro
            340             345             350

Gly Leu Ala Pro Asp Val Gln Asp Lys Val Ile Ala Ala Leu His Glu
        355             360             365

Val Leu Ala Thr Leu
    370

<210>   13
<211>   447
<212>   PRT
```

19

<213> Streptomyces eurythermus

<400> 13

Val Ser Pro Ala Pro Ala Thr Glu Asp Pro Ala Ala Ala Gly Arg Arg
1   5   10   15

Leu Gln Leu Thr Arg Ala Ala Gln Trp Phe Ala Gly Thr Gln Asp Asp
            20   25   30

Pro Tyr Ala Leu Val Leu Arg Ala Glu Ala Thr Asp Pro Ala Pro Tyr
        35   40   45

Glu Glu Arg Ile Arg Ala His Gly Pro Leu Phe Arg Ser Asp Leu Leu
    50   55   60

Asp Thr Trp Val Thr Ala Ser Arg Ala Val Ala Asp Glu Val Ile Thr
65   70   75   80

Ser Pro Ala Phe Asp Gly Leu Thr Ala Asp Gly Arg Arg Pro Gly Ala
                85   90   95

Arg Glu Leu Pro Leu Ser Gly Thr Ala Leu Asp Ala Asp Arg Ala Thr
            100   105   110

Cys Ala Arg Phe Gly Ala Leu Thr Ala Trp Gly Gly Pro Leu Leu Pro
        115   120   125

Ala Pro His Glu Arg Ala Leu Arg Glu Ser Ala Glu Arg Arg Ala His
    130   135   140

Thr Leu Leu Asp Gly Ala Glu Ala Ala Leu Ala Ala Asp Gly Thr Val
145   150   155   160

Asp Leu Val Asp Ala Tyr Ala Arg Arg Leu Pro Ala Leu Val Leu Arg
                165   170   175

Glu Gln Leu Gly Val Pro Glu Glu Ala Ala Thr Ala Phe Glu Asp Ala
            180   185   190

Leu Ala Gly Cys Arg Arg Thr Leu Asp Gly Ala Leu Cys Pro Gln Leu
        195   200   205

Leu Pro Asp Ala Val Ala Gly Val Arg Ala Glu Ala Ala Leu Thr Ala
    210   215   220

Val Leu Ala Ser Ala Leu Arg Gly Thr Pro Ala Gly Arg Ala Pro Asp
225   230   235   240

Ala Val Ala Ala Ala Arg Thr Leu Ala Val Ala Ala Ala Glu Pro Ala
                245   250   255

Ala Thr Leu Val Gly Asn Ala Val Gln Glu Leu Leu Ala Arg Pro Ala
                                20

Gln Trp Ala Glu Leu Val Arg Asp Pro Arg Leu Ala Ala Ala Ala Val
        275   280   285

· Thr Glu Thr Leu Arg Val Ala Pro Pro Val Arg Leu Glu Arg Arg Val
      290   295   300

Ala Arg Glu Asp Thr Asp Ile Ala Gly Gln Arg Leu Pro Ala Gly Gly
305   310   315   320

Ser Val Val Ile Leu Val Ala Ala Val Asn Arg Ala Pro Val Ser Ala
            325   330   335

Gly Ser Asp Ala Ser Thr Thr Val Pro His Ala Gly Gly Arg Pro Arg
        340   345   350

Thr Ser Ala Pro Ser Val Pro Ser Ala Pro Phe Asp Leu Thr Arg Pro
        355   360   365

Val Ala Ala Pro Gly Pro Phe Gly Leu Pro Gly Asp Leu His Phe Arg
    370   375   380

Leu Gly Gly Pro Leu Val Gly Thr Val Ala Glu Ala Ala Leu Gly Ala
385   390   395   400

Leu Ala Ala Arg Leu Pro Gly Leu Arg Ala Ala Gly Pro Ala Val Arg
            405   410   415

Arg Arg Arg Ser Pro Val Leu His Gly His Ala Arg Leu Pro Val Ala
        420   425   430

Val Ala Arg Thr Ala Arg Asp Leu Pro Ala Thr Ala Pro Arg Asn
        435   440   445

<210> 14
<211> 424
<212> PRT
<213> Streptomyces eurythermus

<400> 14

Met Arg Ile Leu Leu Thr Ser Phe Ala His Asn Thr His Tyr Tyr Asn
1   5   10   15

Leu Val Pro Leu Gly Trp Ala Leu Arg Ala Ala Gly His Asp Val Arg
            20   25   30

Val Ala Ser Gln Pro Ser Leu Thr Gly Thr Ile Thr Gly Ser Gly Leu
        35   40   45

Thr Ala Val Pro Val Gly Asp Asp Thr Ala Ile Val Glu Leu Ile Thr
    50   55   60

21

Glu Ile Gly Asp Asp Leu Val Leu Tyr Gln Gln Gly Met Asp Phe Val
65   70   75   80

Asp Thr Arg Asp Glu Pro Leu Ser Trp Glu His Ala Leu Gly Gln Gln
                85   90   95

Thr Ile Met Ser Ala Met Cys Phe Ser Pro Leu Asn Gly Asp Ser Thr
            100   105   110

Ile Asp Asp Met Val Ala Leu Ala Arg Ser Trp Lys Pro Asp Leu Val
        115   120   125

Leu Trp Glu Pro Phe Thr Tyr Ala Gly Pro Val Ala Ala His Ala Cys
    130   135   140

Gly Ala Ala His Ala Arg Leu Leu Trp Gly Pro Asp Val Val Leu Asn
145   150   155   160

Ala Arg Arg Gln Phe Thr Arg Leu Leu Ala Glu Arg Pro Val Glu Gln
            165   170   175

Arg Glu Asp Pro Val Gly Glu Trp Leu Thr Trp Thr Leu Glu Arg His
        180   185   190

Gly Leu Ala Ala Asp Ala Asp Thr Ile Glu Glu Leu Phe Ala Gly Gln
        195   200   205

Trp Thr Ile Asp Pro Ser Ala Gly Ser Leu Arg Leu Pro Val Asp Gly
    210   215   220

Glu Val Val Pro Met Arg Phe Val Pro Tyr Asn Gly Ala Ser Val Val
225   230   235   240

Pro Ala Trp Leu Ser Glu Pro Pro Ala Arg Pro Arg Val Cys Val Thr
                245   250   255

Leu Gly Val Ser Thr Arg Glu Thr Tyr Gly Thr Asp Gly Val Pro Phe
            260   265   270

His Glu Leu Leu Ala Gly Leu Ala Asp Val Asp Ala Glu Ile Val Ala
        275   280   285

Thr Leu Asp Ala Gly Gln Leu Pro Asp Ala Ala Gly Leu Pro Gly Asn
    290   295   300

Val Arg Val Val Asp Phe Val Pro Leu Asp Ala Leu Leu Pro Ser Cys
305   310   315   320

Ala Ala Ile Val His His Gly Gly Ala Gly Thr Cys Phe Thr Ala Thr
            325   330   335

22

```
Val His Gly Val Pro Gln Ile Val Val Ala Ser Leu Trp Asp Ala Pro
            340                 345                 350

Leu Lys Ala His Gln Leu Ala Glu Ala Gly Ala Gly Ile Ala Leu Asp
            355                 360                 365

Pro Gly Glu Leu Gly Val Asp Thr Leu Arg Gly Ala Val Val Arg Val
            370                 375                 380

Leu Glu Ser Arg Glu Met Ala Val Ala Ala Arg Arg Leu Ala Asp Glu
385                 390                 395                 400

Met Leu Ala Ala Pro Thr Pro Ala Ala Leu Val Pro Arg Leu Glu Arg
                405                 410                 415

Leu Thr Ala Ala His Arg Arg Ala
            420
```

```
Met Asn Leu Glu Tyr Ser Gly Asp Ile Ala Arg Leu Tyr Asp Leu Val
1               5                   10                  15

His Gln Gly Lys Gly Lys Asp Tyr Arg Ala Glu Ala Glu Glu Leu Ala
            20                  25                  30

Ala Leu Val Thr Gln Arg Arg Pro Gly Ala Arg Ser Leu Leu Asp Val
            35                  40                  45

Ala Cys Gly Thr Gly Met His Leu Arg His Leu Gly Asp Leu Phe Glu
        50                  55                  60

Glu Val Ala Gly Val Glu Met Ser Pro Asp Met Leu Ala Ile Ala Gln
65                  70                  75                  80

Arg Arg Asn Pro Glu Ala Gly Ile His Arg Gly Asp Met Arg Asp Phe
                85                  90                  95

Ala Leu Gly Arg Arg Phe Asp Ala Val Ile Cys Met Phe Ser Ser Ile
                100                 105                 110

Gly His Met Arg Asp Gln Arg Glu Leu Asp Ala Ala Ile Gly Arg Phe
            115                 120                 125

Ala Ala His Leu Pro Ser Gly Gly Val Val Ile Val Asp Pro Trp Trp
            130                 135                 140

Phe Pro Glu Thr Phe Thr Pro Gly Tyr Val Gly Ala Ser Leu Val Glu
145                 150                 155                 160
```

23

```
Ala Glu Gly Arg Thr Ile Ala Arg Phe Ser His Ser Ala Leu Glu Asp
                165             170             175

Gly Ala Thr Arg Ile Asp Val Asp Tyr Leu Val Gly Val Pro Gly Glu
            180             185             190

Gly Val Arg His Leu Lys Glu Thr His Arg Ile Thr Leu Phe Gly Arg
        195             200             205

Ala Gln Tyr Glu Ala Ala Phe Thr Ala Ala Gly Met Ser Val Glu Tyr
    210             215             220

Leu Pro His Ala Ala Thr Asp Arg Gly Leu Phe Val Gly Val Gln Ala
225             230             235             240


<210>   16
<211>   72
<212>   DNA
<213>   Artificial

<220>
<223>   primer

<400>   16
ggggaattca gatctggtct agaggtcagc cggcgtggcg gcgcgtgagt tcctccagtc        60

gcgggacgat ct                                                           72


<210>   17
<211>   38
<212>   DNA
<213>   Artificial

<220>
<223>   Primer

<400>   17
gggcatatga acgaccgtcc ccgccgcgcc atgaaggg                                38


<210>   18
<211>   50
<212>   DNA
<213>   Artificial

<220>
<223>   primer

<400>   18
cccctctaga ggtcactgtg cccggctgtc ggcggcggcc ccgcgcatgg                   50


<210>   19
<211>   52
<212>   DNA
<213>   Artificial

<220>
<223>   primer

<400>   19
```

cccctctaga ggtcatgcgc gctccagttc cctgccgccc ggggaccgct tg   52

<210> 20
<211> 81
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 20
gggtctagat cgattaatta aggaggacat tcatgcgcgt cctggtgacc ggaggtgcgg   60

gcttcatcgg ctcgcacttc a   81

<210> 21
<211> 40
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 21
gggcatatgt acgagggcgg gttcgccgag ctttacgacc   40

<210> 22
<211> 40
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 22
ggggtctaga ggtcatccgc gcacaccgac gaacaacccg   40

<210> 23
<211> 38
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 23
gggcatatgg cggcgagcac tacgacggag gggaatgt `   38

<210> 24
<211> 38
<212> DNA
<213> Artificial

<220>
<223> primer

<400> 24
gggtctagag gtcacgggtg gctcctgccg gccctcag   38

<210> 25
<211> 22
<212> DNA
<213> Artificial

25

<220>
<223> primer

<400> 25
catcgtcaag gagttcgacg gt   22

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<211> 21
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